CLAIMS

WHAT IS CLAIMED IS:

1. A method of manufacturing an electrolyte comprising:

coupling a substrate to a charged electrode; and

electrodepositing a polymeric electrolyte on said substrate.

2. The method of claim 1, wherein said substrate comprises a conductive porous substrate.

3. The method of claim 2, wherein said conductive porous substrate comprises a porous stainless steel substrate.

4. The method of claim 2, wherein said porous substrate is electrically coupled to said charged electrode.

5. The method of claim 2, wherein said electrodepositing a polymeric electrolyte further comprises:

disposing said porous substrate and said charged electrode in a polymeric electrolyte solution containing charged polymeric electrolyte particles; and

generating an electric field in said polymeric electrolyte solution;

wherein said generated electric field accelerates charged polymeric electrolyte particles to said porous substrate.

6. The method of claim 5, wherein said charged polymeric electrolyte particles further comprise perfluorosulfonate ionomer particles.

7. The method of claim 6, wherein said perfluorosulfonate ionomer particles are deposited on said porous substrate by electrophoretic deposition.

8. The method of claim 7, further comprising removing deposited perfluorosulfonate ionomer particles from an outer surface of said porous substrate.

9. The method of claim 8, wherein said removal of deposited perfluorosulfonate ionomer particles comprises machining said particles with a blade.

10. The method of claim 3, wherein said electrodepositing a polymeric electrolyte further comprises:

disposing said porous substrate and said charged electrode in a polymeric electrolyte solution containing charged polymeric electrolyte ions; and

generating an electric field in said polymeric electrolyte solution;

wherein said generated an electric field accelerates charged polymeric electrolyte ions to said porous substrate.

11. The method of claim 10, wherein said charged polymeric electrolyte ions further comprise perfluorosulfonate ionomer ions.

12. The method of claim 11, wherein said perfluorosulfonate ionomer ions are deposited on said porous substrate by electrolytic deposition.

13. The method of claim 12, wherein said perfluorosulfonate ionomer ions are deposited on an outer surface of said porous substrate.

14. The method of claim 1, wherein said substrate comprises a non-conductive porous substrate.

15. The method of claim 14, wherein said porous substrate is mechanically coupled to said charged electrode.

16. The method of claim 15, wherein said electrodepositing a polymeric electrolyte further comprises:

disposing said porous substrate and said charged electrode in a polymeric electrolyte solution containing charged polymeric electrolyte particles; and

generating an electric field in said polymeric electrolyte solution;

wherein said generated electric field accelerates charged polymeric electrolyte particles to said porous substrate.

17. The method of claim 16, wherein said charged polymeric electrolyte particles further comprise perfluorosulfonate ionomer particles.

18. The method of claim 17, wherein said perfluorosulfonate ionomer particles are deposited on said porous substrate by electrophoretic deposition.

19. An electrolyte comprising:

a porous substrate; and

a polymeric electrolyte disposed within said porous substrate;

wherein said polymeric electrolyte is electrodeposited within said porous substrate.

20. The electrolyte of claim 19, wherein said polymeric electrolyte comprises a perfluorosulfonate ionomer.

21. The electrolyte of claim 20, wherein said perfluorosulfonate ionomer is deposited on said porous substrate by electrophoretic deposition.

22. The electrolyte of claim 20, wherein said perfluorosulfonate ionomer is deposited on said porous substrate by electrolytic deposition.

23. The electrolyte of claim 19, wherein said porous substrate comprises a conductive material.

24. The electrolyte of claim 23, wherein said porous substrate comprises stainless steel wool.

25. The electrolyte of claim 19, wherein said porous substrate comprises a non-conductive material.

26. A fuel cell comprising:

a cathode;

an anode; and

an electrolyte disposed between said anode and said cathode;

wherein said electrolyte includes a substrate and polymeric electrolyte electrodeposited on said substrate.

27. The fuel cell of claim 26, wherein said polymeric electrolyte comprises a perfluorosulfonate ionomer.

28. The fuel cell of claim 27, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrophoretic deposition.

29. The fuel cell of claim 27, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrolytic deposition.

30. The fuel cell of claim 26, wherein said substrate comprises a porous conductive material.

31. The fuel cell of claim 28, wherein said substrate further comprises porous stainless steel.

32. The fuel cell of claim 26, wherein said substrate comprises a porous non-conductive material.

33. An electrochemical apparatus comprising:

a housing;

a fuel cell disposed within said housing; and

an electrolyte disposed in said fuel cell;

wherein said electrolyte includes a substrate and a polymeric electrolyte electrodeposited on said substrate.

34. The electrochemical apparatus of claim 33, wherein said substrate comprises a porous substrate.

35. The electrochemical apparatus of claim 34, wherein said polymeric electrolyte comprises a perfluorosulfonate ionomer.

36. The electrochemical apparatus of claim 35, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrophoretic deposition.

37. The electrochemical apparatus of claim 35, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrolytic deposition.

38. The electrochemical apparatus of claim 35, wherein said substrate comprises a porous conductive material.

39. The electrochemical apparatus of claim 38, wherein said porous conductive substrate comprises a porous stainless steel.

40. The electrochemical apparatus of claim 35, wherein said substrate comprises a non-conductive porous material.

41. An electronic device comprising:

an electrochemical cell providing power to an electrical power consuming apparatus;

a fuel source; and

a fuel flow path fluidly coupling said electrochemical cell and said fuel source;

wherein said electrochemical cell includes a housing, a fuel cell disposed within said housing, and an electrolyte disposed in said fuel cell, wherein said electrolyte includes a substrate and a polymeric electrolyte electrodeposited on said substrate.

42. The electronic device of claim 41, wherein said substrate comprises a porous substrate.

43. The electronic device of claim 42, wherein said polymeric electrolyte comprises a perfluorosulfonate ionomer.

44. The electronic device of claim 43, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrophoretic deposition.

45. The electronic device of claim 43, wherein said perfluorosulfonate ionomer is deposited on said substrate by electrolytic deposition.

46. The electronic device of claim 43, wherein said substrate comprises a porous conductive material.

47. The electronic device of claim 46, wherein said porous conductive substrate comprises a stainless steel wool.

48. The electronic device of claim 43, wherein said substrate comprises a non-conductive porous material.

49. A means for reducing fuel crossover in a fuel cell comprising:

a fuel cell including a cathode, an anode, and an electrolyte disposed between said anode and said cathode;

wherein said electrolyte includes a structural means for providing structural stability to said electrolyte, and an electrodeposited electrolyte means for providing electrolyte characteristics to said electrolyte.

50. The means for reducing fuel crossover of claim 49, wherein said structural means comprises a substrate.

51. The means for reducing fuel crossover of claim 50, wherein said structural means comprises a porous conductive substrate.

52. The means for reducing fuel crossover of claim 50, wherein said structural means comprises a porous non-conductive substrate.

53. The means for reducing fuel crossover of claim 49, wherein said electrodeposited electrolyte further comprises a perfluorosulfonate ionomer electrodeposited on said structural means.

54. The means for reducing fuel crossover of claim 53, wherein said perfluorosulfonate ionomer is electrodeposited on said structural means from a hydrated solution.